

User's Guide for California PATHWAYS model version 2.4.0

Prepared for: California Air Resources Board

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1. Intro to California PATHWAYS

1.1 Purpose

California PATHWAYS (CA PATHWAYS) was originally designed by Energy & Environmental Economics with support from Lawrence Berkeley National Labs (LBNL). This version has been updated for the California Air Resources Board (ARB). The purpose of the model is to evaluate the feasibility and cost of a range of GHG reduction cases in California within the context of complying with California's long-term greenhouse gas (GHG) emission reduction goals.

This user's guide is designed to provide a basic overview of how to open the model and run and evaluate cases using the Analytica-based California PATHWAYS tool. For a description of the model structure, please see the supporting model documentation. For more information about how to use the Analytica platform generally, please see the online tutorials developed by Lumina, as described in Section 2.5.

1.2 Version

Version 2.4.0 is the current version of the CA PATHWAYS model. This model replaces the prior version 2.3.2 which was released in February 2016.

1.3 Modeling Approach

CA PATHWAYS is a California-wide, economy-wide infrastructure-based GHG and cost analysis tool. Components include:

- Equipment stock turn-over for many sectors, with rates based on lifetime of equipment; energy use determined as service demand is met by the stock of equipment in each year
- Tracking of energy and energy infrastructure costs
- Bottom up forecast of service demand by end use, driven by variables including population, residential and commercial square footage, space heating/cooling, water heating, lighting, etc.
- Hourly electricity demand and supply detail, simulating required planning, system operation, and cost
- CA PATHWAYS is not an optimization model: the user is in full control of the outcomes.

2. Installation of California PATHWAYS and Analytica

2.1 Installing Analytica

The software platform Analytica by Lumina Systems is required to run CA PATHWAYS. Once Analytica is installed on your computer, opening CA PATHWAYS does not require any further installation steps. This

section is designed to guide the user through the download and installation of Analytica and CA PATHWAYS.

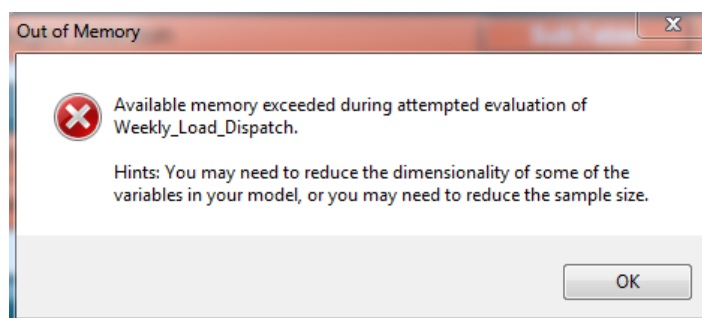
System Requirements

To use Analytica for CA PATHWAYS, the following minimum system requirements apply:

- Minimum 16GB of RAM (24 GB or more recommended)
- Windows 7 or later, dual core 64 bit processor

Running 1 case on a computer meeting the minimum requirements above can take 20-30 minutes.

In general, a faster CPU and more RAM will lead to CA PATHWAYS cases running more quickly. With the minimum requirements listed above it is not recommended to run more than one case simultaneously; on more powerful computers, running 2-3 cases simultaneously is possible. Running too many cases simultaneously or not meeting system requirements may lead to an Out of Memory error or computer crash. An example of the Out of Memory error is displayed below:



2.2 Recommended Versions of Analytica

Free 101 edition of Analytica: For users who would like to run existing cases, obtain results from the CA PATHWAYS model, or create and save new cases using the pre-existing model structure. This version of the software can be downloaded as described below.

The purchase of a Professional Analytica license is required to edit variables in the code and an Enterprise or Optimizer license is required to read and write data files into or out of the Analytica platform.

Currently, the latest version of Analytica is 4.6. Lumina issues periodic updates to its software. PATHWAYS version 2.4.0 is compatible with Analytica version 4.6. For future Analytica software updates, there are no guarantees that the new software will be compatible with PATHWAYS 2.4.0 and in some cases updates may result in new errors. It is recommended that users do not use new updates unless notified by E3 that the new update is compatible with CA PATHWAYS version 2.4.0.

2.3 Licenses

A license is needed to use Analytica. The Analytica Free Player license is automatically included when the software is downloaded, and can be used by anyone.

2.4 Downloading Analytica Free Player

Step 1. Go to Lumina's website and download the Analytica free player at:

<http://www.lumina.com/support/downloads/>

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Support

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Analytica Downloads

Select the version of Analytica to download according to whether you have a 32-bit or 64-bit version of the Windows Operating System:

- AnaSetup.exe** To download installer for Analytica 32-bit
- Ana64Setup.exe** To download installer for Analytica 64-bit

These installers include the Analytica Tutorial, User Guide, and Optimizer Guide as PDF documents. The current release is 4.5.3.

You won't need an activation code for the **Analytica Free 101 edition**. If you have purchased Analytica, you should receive an email with a code to activate it as your purchased edition (Professional, Enterprise, Optimizer). If you cannot find an email with an activation code, please contact Lumina at support@lumina.com or (+01)-650-212-1212.

For a floating license you will need the name of the server computer running the Reprise License Manager (RLM). Contact your IT or software license admin if needed.

See below to download ADE (Analytica Decision Engine).

Click on “Ana64Setup.exe” to begin downloading the 64-bit version of Analytica. The 32-bit version of the software is not compatible with CA PATHWAYS. After downloading, double click on the file to begin the installation process. Once installed you do not need an activation key to run the free version of Analytica.

Step 2. Follow Instructions on the Lumina website to download and Install Analytica software.

2.5 User Guide & Tutorials

Details about how to use the Analytica software are available in the Analytica User Guide, available at:

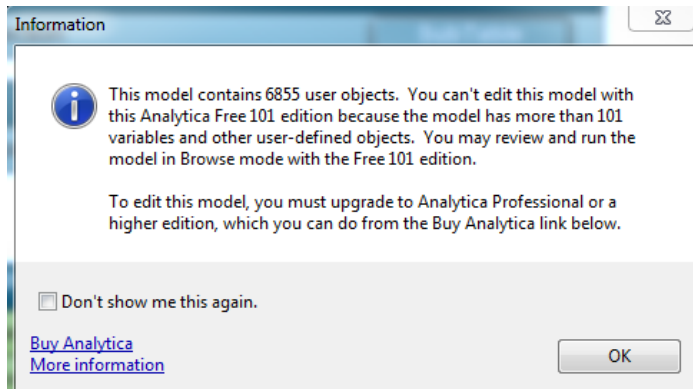
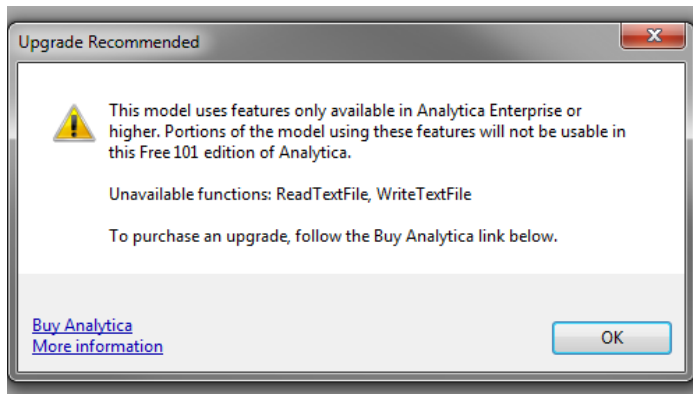
<http://www.lumina.com/support/downloads/>

Lumina also provides tutorials in written and video versions. Tutorials contain further information about installing Analytica (pg. 4-6) and information on creating and editing models in Analytica, available at the same link as above.

3. Running & Evaluating Pre-Defined Cases

3.1 Opening CA PATHWAYS in the Free Player Version of Analytica

Once Analytica is downloaded a user can open CA PATHWAYS. Opening the model in the Free Player version of Analytica will result in the following two messages after the model loads:



Unless you wish to purchase an upgraded version of Analytica, click “OK” on both of these screens.

3.2 User Interface

The main user interface for CA PATHWAYS is pictured below. Sections of the model are highlighted with numbers, explained below.

The screenshot displays the CA PATHWAYS user interface, which is organized into several functional areas:

- 1. Sector Inputs:** A row of six tabs at the top left: Residential Sector Inputs, Commercial Sector Inputs, Transportation Sector Inputs, Other Demand Sector Inputs, Energy Supply Inputs, and General Model Inputs. A yellow **Model Details** button is located to the right of these tabs.
- 2. Case Selection:** A section below the Sector Inputs tabs containing two rows. The first row has a text field for "Name Cases" and an "Edit Table" button. The second row has a text field for "Select Cases for Analysis" and an "Edit Table" button.
- 3. Package Creation:** A section to the right of Case Selection with a "Name Packages" button.
- 4. Package Selection:** A section below Package Creation with a "SubTable" button.
- 5. Main Outputs:** A large section on the left side of the bottom half, containing multiple tables of results. These include:
 - Key Outputs:** (mmCO2e, Btu) with a "Calc" button.
 - Greenhouse Gas Emissions:** A table with rows for Total Greenhouse Gas Emissions, Combustion (Energy-Related) Greenhouse Gas Emissions, Non Energy-Related Greenhouse Gas Emissions, and Delivered Energy Emissions Rate, each with a "Calc" button.
 - Energy GHGs by Sector and Fuel Output:** (Tons CO2e) with a "Calc" button.
 - Energy Demand:** A table with rows for Final Energy Demand, Final Energy Demand, Final Energy Demand With Biofuel Breakdown, and Subsector Energy Demand, each with a "Calc" button.
 - Energy Supply:** A table with rows for Composition of Pipeline Gas Supply by Fuel Type, Liquid Biofuel Composition, Low-Carbon Intensity Gas Supply in Pipeline, Liquid Fuel Supply, Biomass Utilization, Total Selected Biomass, and Total Selected Biofuel, each with a "Calc" button.
 - Cost Metrics:** A table with rows for Total Annual Levelized Capital and Energy Costs, Non Energy GHG Costs, Household Costs, and Commercial Costs (excluding trucking), each with a "Calc" button.
- 6. Save Results:** A section at the bottom right containing a "Save Results (requires professional Analytica license)" button and an "Export Flat Files of Results" button.

- 1. Sector Inputs:** Double clicking on any of the six input tabs displays a list of inputs and some outputs associated with that sector. From that view, further detail is available for some sectors by clicking "All [Sector] Inputs." Subtables display model inputs, which may also be

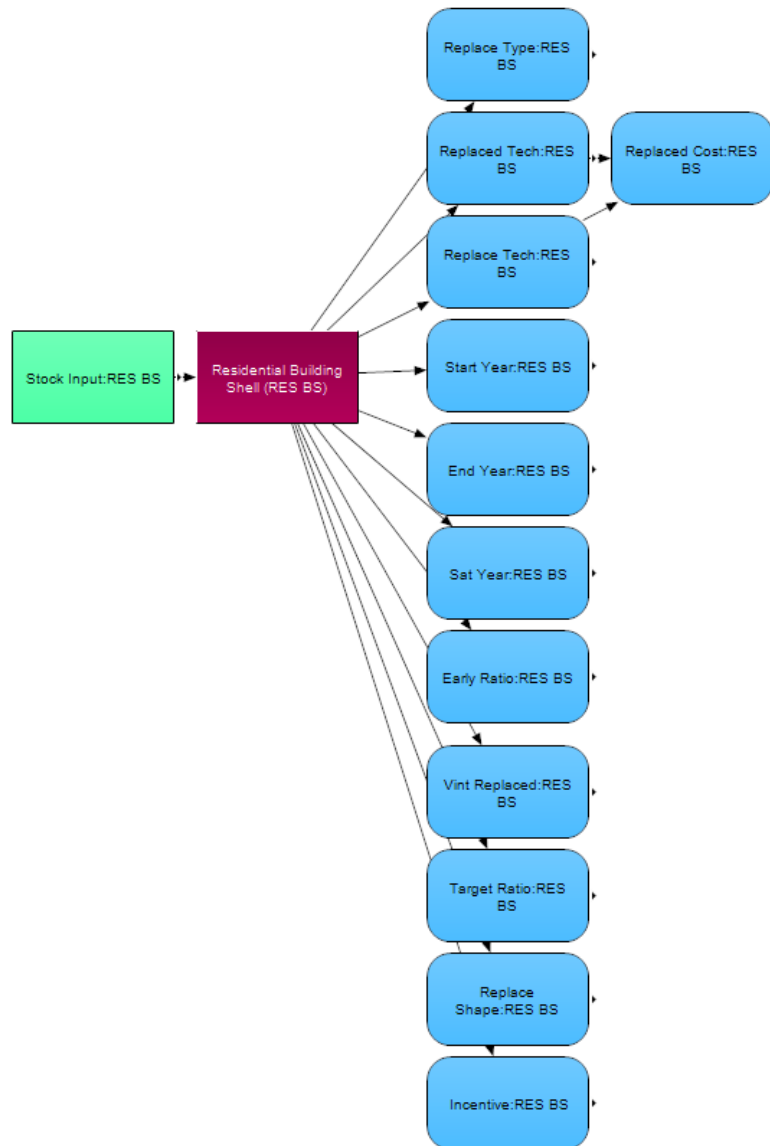
represented graphically (see Section 3.4) or as diagrams by clicking the “Diagram Window” button once viewing a subtable.

An example of this process is shown below for the Residential Sector Inputs button. Double clicking the button where the **red** box and arrow are shown displays all Residential Inputs. Clicking any of the subtable buttons (**blue** box and arrow) will display input sub-tables as shown below. Clicking any of the “Calc” buttons in **black** will run all calculations in the model necessary to provide that value, but will not run the full model.

The screenshot displays the software interface for the Residential Sector Inputs. At the top, a button labeled "All New Inputs" is highlighted with a red box and a red arrow. Below this, a table of Residential Inputs is shown. The table has two main sections: "Stock Measure Inputs" and "Stock Measure Outputs". Each section contains a list of measures with "SubTable" buttons. A blue box and a blue arrow point to one of the "SubTable" buttons. Below the table, there is a toolbar with various icons. At the bottom, the "Edit Table of Residential Building Shell (RES BS)" window is open. It shows a table of measures with columns for Replacement Type, Technology, Technology Replaced, Measure Start Year, Measure Saturation Year, and Measure End Year. The table contains 10 measures, all with "Natural Replacement" as the Replacement Type and "Reference" as the Technology and Technology Replaced.

Measure	Replacement Type	Technology	Technology Replaced	Measure Start Year	Measure Saturation Year	Measure End Year
Measure 1	Natural Replacement	IECC 2000	Reference	2014	2014	2050
Measure 2	Natural Replacement	Reference	Reference	2014	2014	2050
Measure 3	Natural Replacement	Reference	Reference	2014	2014	2050
Measure 4	Natural Replacement	Reference	Reference	2014	2014	2050
Measure 5	Natural Replacement	Reference	Reference	2014	2014	2050
Measure 6	Natural Replacement	Reference	Reference	2014	2014	2050
Measure 7	Natural Replacement	Reference	Reference	2014	2014	2050
Measure 8	Natural Replacement	Reference	Reference	2014	2014	2050
Measure 9	Natural Replacement	Reference	Reference	2014	2014	2050
Measure 10	Natural Replacement	Reference	Reference	2014	2014	2050

Clicking the Diagram window (**blue** arrow above) button then displays the influence diagram for the selected input. An example is shown below for Residential Building Shell.



Alternatively, clicking “All Res Inputs” on the first subtable screen above (red arrow) brings up the screen below, from which the user may then double click a desired list or table of Residential data.

PATHWAYS CA 2.3 ► Residential Sector Inputs ► All Res Inputs ►

Residential Packages

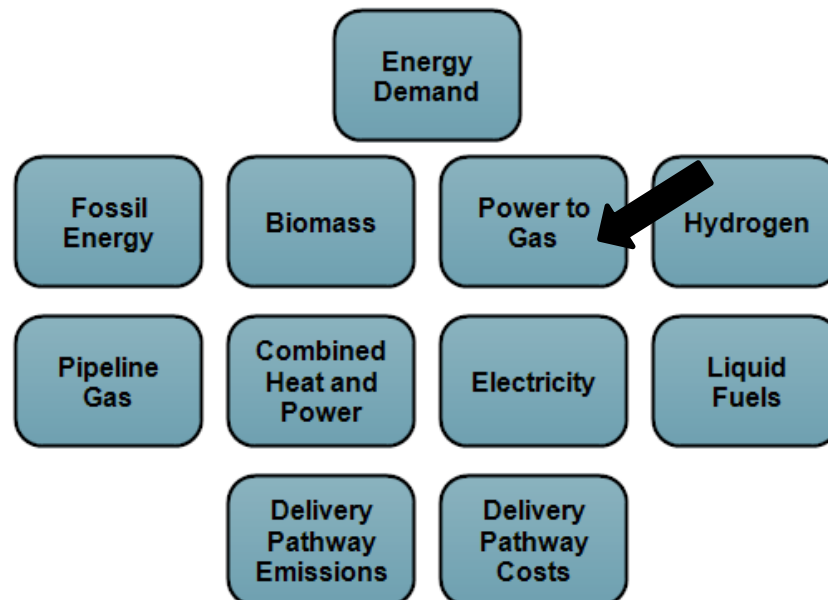
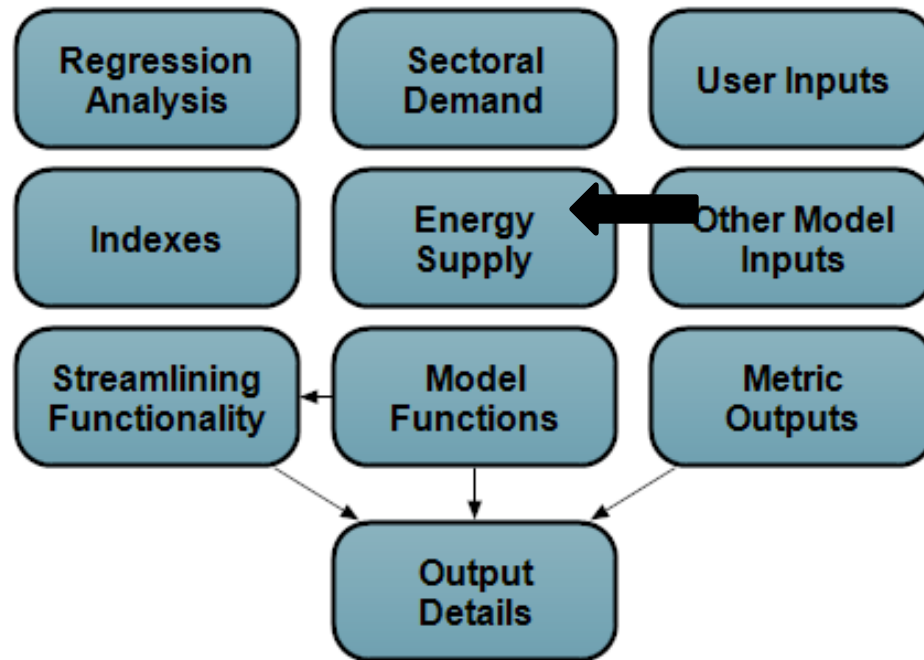
Packages: RES | List

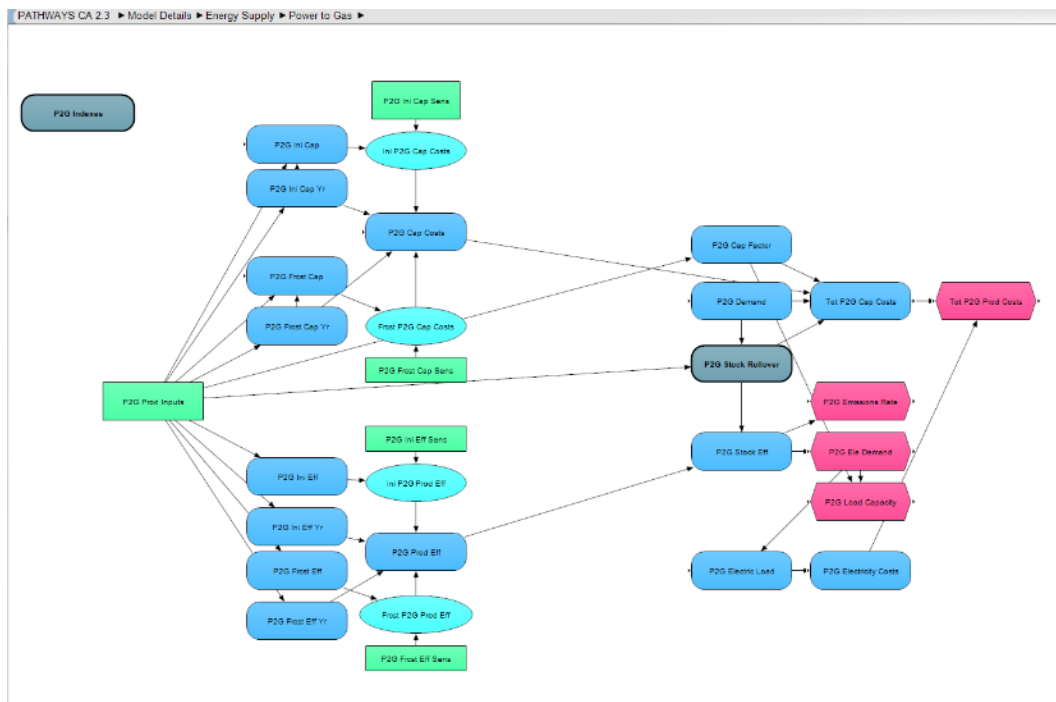
End Use	Tech. Indices	CC	Cost	Stock Change Measure Inputs	Demand Change Measure
Housing stock	Tech RES HS List			Stock Rollover Measure: RES HS SubTable	
Building shell	Tech RES BS List Edit Table		Edit Table	Residential Building Shell (RES BS) SubTable	
Water Heating	Tech RES WH List Edit Table		Edit Table	Residential Water Heating (RES WH) SubTable	Demand Change Measure
Space Heating	Tech RES SH List Edit Table		Edit Table	Residential Space Heating (RES SH) SubTable	Demand Change Measure
Central Air Conditioning	Tech RES CA List Edit Table		Edit Table	Residential Central AC (RES CA) SubTable	Demand Change Measure
Room Air Conditioning	Tech RES RA List Edit Table		Edit Table	Residential Room AC (RES RA) SubTable	Demand Change Measure
Lighting	Tech RES LI List Edit Table		Edit Table	Residential Lighting (RES LI) SubTable	Demand Change Measure
Clothes Washer	Tech RES LW List Edit Table		Edit Table	Residential Clothes Washing (RES LW) SubTable	Demand Change Measure
Clothes Dryer	Tech RES CD List Edit Table		Edit Table	Residential Clothes Drying (RES CD) SubTable	Demand Change Measure
Dish Washer	Tech RES DW List Edit Table		Edit Table	Residential Dishwashing (RES DW) SubTable	Demand Change Measure
Refrigerator	Tech RES RF List Edit Table		Edit Table	Residential Refrigeration (RES RF) SubTable	Demand Change Measure
Freezer	Tech RES FR List Edit Table		Edit Table	Residential Freezing (RES FR) SubTable	Demand Change Measure
Cooking	Tech RES CK List Edit Table		Edit Table	Residential Cooking (RES CK) SubTable	Demand Change Measure
Other					Demand Change Measure

- Case Selection:** Choose which cases to run (Active Cases). See section 3.3 of this guide for more information.
- Model Details:** Brings up the main diagram window for the model. The user may then double click to display sectoral and sub-sectoral diagrams. Subsectoral diagrams (e.g. Model Details → Sectoral Demand → Transportation, Communication, and Utilities, or Model Details → Energy Supply → Fossil Energy) displays influence diagrams.¹ Clicking on variables within influence diagrams displays information about the variable. The variable can also be represented as a table or graph, see 3.4.

An example of this process is shown below for the Power to Gas (P2G) influence diagram. Double Clicking the buttons highlighted with the black arrows allows the user to access the P2G influence diagram. Clicking other buttons allows access of other influence diagrams.

¹ For more on the shapes (variables) and functionalities of influence diagrams, see the Analytica tutorial on using influence diagrams, <https://www.youtube.com/watch?v=dSzvuMGJTIk>






Once at the influence diagram level, double clicking on any variable allows the user to see how that variable is defined.

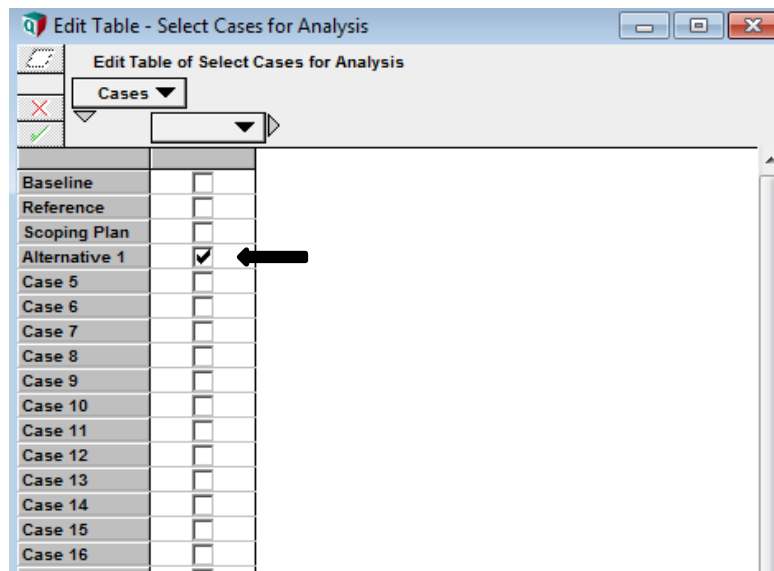
4. **Packages:** Packages define the set of input assumptions associated with each sector. Combinations of different packages are used to create economy-wide scenarios. This section of the model on package naming and selection is to create user-defined cases (see Section 4).
5. **Outputs:** Clicking “Calc” will run selected cases (see 3.3 on Selecting Cases). See Evaluating Results (3.4) for more information.
6. **Export Flat Output Files:** Exports categories of pre-defined results into flat files that can be viewed and manipulated in Excel. Requires professional or higher version of Analytica.


3.3 Selecting Cases

CA PATHWAYS contains three predefined cases: Reference (business as usual with pre-SB 350 mitigation policies); Scoping Plan (Proposed mitigation scenario with cap-and-trade); and Alternative 1 (no cap-and-trade mitigation scenario). See the January 2017 ARB Proposed Scoping Plan for more information about these scenarios. The model provides the option for creating additional user-defined cases (see Section 4). Cases are accessed by clicking on the “Edit Table” button next to “Select Cases for Analysis,” toward the top left of the opening model interface screen.

Case Selection	
Name Cases	Edit Table
Select Cases for Analysis	Edit Table 
Sensitivity Setting	Base ▼

Analytica will then bring up the case selection screen, where the user can check boxes for the cases they wish to run – these will become the Active Cases. After checking the desired boxes, the user may return to the main screen of the model to run the selected cases by exiting this screen using the “x” in the upper right corner of the dialogue box. It is not advisable to run more than one case simultaneously with a computer meeting the minimum system requirements.



Edit Table of Select Cases for Analysis	
Cases ▼	
Baseline	<input type="checkbox"/>
Reference	<input type="checkbox"/>
Scoping Plan	<input type="checkbox"/>
Alternative 1	<input checked="" type="checkbox"/> 
Case 5	<input type="checkbox"/>
Case 6	<input type="checkbox"/>
Case 7	<input type="checkbox"/>
Case 8	<input type="checkbox"/>
Case 9	<input type="checkbox"/>
Case 10	<input type="checkbox"/>
Case 11	<input type="checkbox"/>
Case 12	<input type="checkbox"/>
Case 13	<input type="checkbox"/>
Case 14	<input type="checkbox"/>
Case 15	<input type="checkbox"/>
Case 16	<input type="checkbox"/>

3.4 Evaluating Results

3.4.1 Calculating Results

The model is run by clicking any of the green “Calc” buttons on the screen associated with every computed variable. Clicking “Calc” once will run the model through to the point in the model at which the result is available. Allow 20-30 minutes for the model to run 1 complete case for the first time, for example by clicking on “calc” for final CA wide GHG emissions. Subsequent calculations will generally require less evaluation time since the model will not need to recalculate all modules.

Model calculations can be stopped at any time by clicking the red “x” in the top dialogue box, shown below. The red X button appears once the user starts running the model.



To check memory usage and to ensure that the model is still calculating, click on “window” → “show memory usage” to view your computer’s computational statistics.

3.4.2 Results Tables

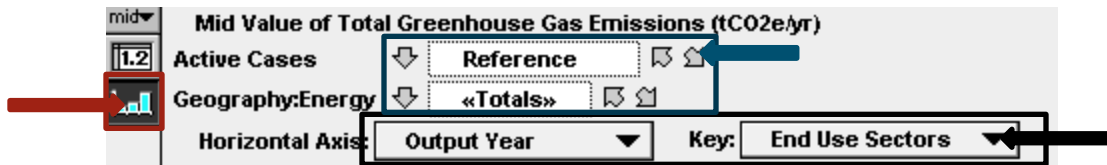
After the model has finished calculating, the “Calc” button will change to a “Result” button. By double clicking on results, a data table or chart of results will be displayed. If a chart is displayed, the data table can be viewed by clicking on the table icon, shown by the **red** box and **red** arrow below.

	2010	2011	2012	2013	2014	2015	
Residential	NAN	NAN	NAN	NAN	NAN	61.43M	
Commercial	NAN	NAN	NAN	NAN	NAN	51.74M	
Transportation	NAN	NAN	NAN	NAN	NAN	180.6M	
Industrial	NAN	NAN	NAN	NAN	NAN	29.69M	
Oil & Gas Extraction	NAN	NAN	NAN	NAN	NAN	15.08M	
Petroleum Refining	NAN	NAN	NAN	NAN	NAN	43.93M	
Agriculture	NAN	NAN	NAN	NAN	NAN	35.5M	
TCU	NAN	NAN	NAN	NAN	NAN	20.08M	
Unspecified	NAN	NAN	NAN	NAN	NAN	0	

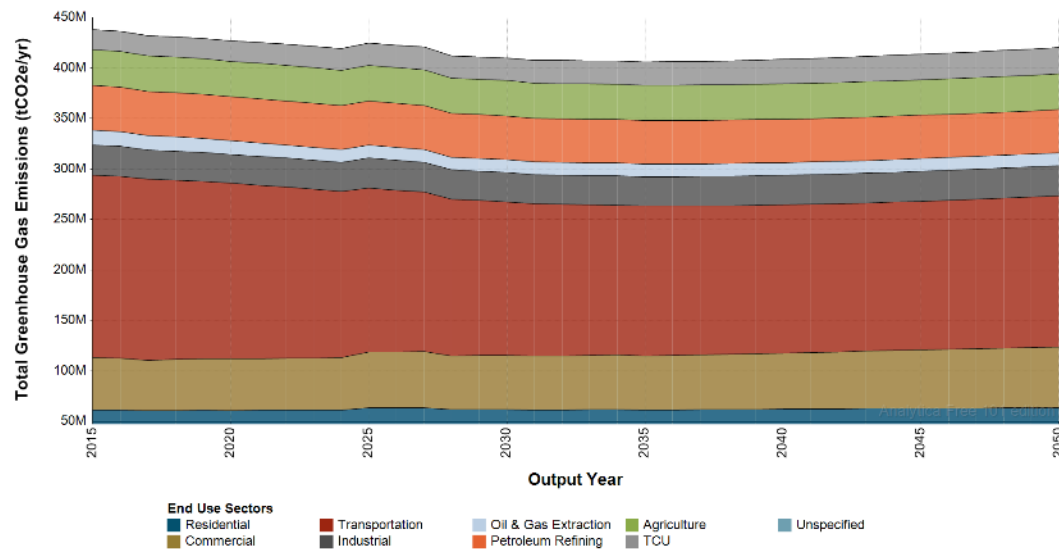
Different table axes are displayed by using the drop down lists on the buttons enclosed in **black** boxes and arrow above. The user may then toggle through what to display on the axes by toggling through the boxes enclosed in **blue** boxes and arrow above (e.g. “Active Cases” will give options to look at any cases that have been run). This allows the user to choose what to display in the table.

3.4.3 Results Graphs

After clicking into case results, a graph of the result can be displayed by clicking on the graph button, shown below with the red box and arrow. As was the case for tables, the black box and arrow below shows where drop-down menus allow the user to choose what will define the x-axis and key labeling for the graph. The blue box and arrow then determine what data will be displayed on the graph, e.g. from which case (Reference, Scoping Plan, or Alternative 1) data will be displayed.



An example graph for GHG emissions by output year for the Reference case is displayed below.



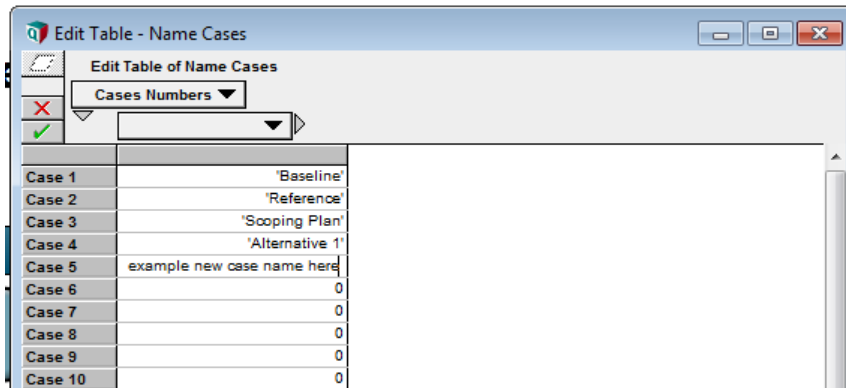
4. User-Defined Cases

4.1 Naming a User-Defined Case

To create a new case, first give your case a new name. The user should begin by clicking “Edit Table” next to the “Name Cases” label on the main user interface.

Case Selection	
Name Cases	Edit Table
Select Cases for Analysis	Edit Table
Sensitivity Setting	Base

This will bring up the table of pre-defined and available case names. Any unnamed cases are available to be named by the user. Existing cases can also be re-named if desired. An example is shown below.



Double clicking in these boxes allows the user to edit the name of the case. New cases will have arbitrary packages assigned by default. The user must change this assignment by creating new packages or selecting different packages (see 4.2 and 4.3).

4.2 Selecting Packages

Once the user has selected their newly named case for analysis, the packages associated with that case must be changed from the default by double clicking the “Subtable” label next to Packages Selection.



The user may then select which package to associate with each sector (Residential, Commercial, Transportation, Industrial, Oil & Gas Extraction, Petroleum Refining, Agriculture, TCU, Non-Energy, Hydrogen, Pipeline Gas, Biomass, Electricity) using drop-down menus. This functionality allows the user to combine packages in ways that are not covered by pre-defined cases.

Below is an example of packages associated with scenarios (Case names listed across top row, Sectors in far left column).

	Reference	Scoping Plan	Alternative 1	example new case name here
Residential	Reference	Scoping Plan A	ARB SPA Plus	Scoping Plan A
Commercial	Reference	Scoping Plan A	ARB SPA Plus	Scoping Plan A
Transportation	Reference	Scoping Plan A	ARB SPA Plus	Scoping Plan A
Industrial	Reference	Straight Line - No fuel switching - Mod - 2016 Start	ARB SPA Plus	Straight Line - No fuel sw
Oil & Gas Extraction	Reference	Scoping Plan A	ARB SPA Plus	Scoping Plan A
Petroleum Refining	Reference	Straight Line	SP+	Sustained Refining Secto
Agriculture	Reference	Scoping Plan A	SP+	Scoping Plan A
TCU	Reference	Scoping Plan A	Scoping Plan A	Scoping Plan A
Non-Energy	Baseline	Scoping Plan	Scoping Plan	Scoping Plan
Hydrogen	Baseline	Straight Line	Straight Line	Straight Line
Pipeline Gas	Zero	Zero	ARB SPA Plus	Zero
Biomass	Reference	Straight Line	SPA: Aggressive Biofuels	Straight Line
Electricity	Reference	Straight Line - IEPR High PV	All-in	SL - IEPR High PV, Min G

4.3 Creating New Packages

To begin the process of creating a new package, click the “Name Packages” button shown below on the opening CA PATHWAYS screen.




The user may then select which sector they would like to create a new package for. The **black** arrow below on the Main Package Screen points to the Residential Sector packages as an example.

Name Packages	
Packages:RES	List
Packages:COM	List
Packages:IND	List
Packages:AGR	List
Packages:OGE	List
Packages:REF	List
Packages:TCU	List
Packages:TRA	List
Packages:ELC	List
Packages:BIO	List
Packages:HYD	List
Packages:GAS	List
Packages:NON	List

Copy Packages	
Package Copying Input	Edit Table
Copy Package	


The user may then name their new package by retitling any of packages not associated with the pre-defined cases.

Description:



Definition:

Baseline
New Residential Package
Not Defined
Reference
Not Defined
Not Defined
Not Defined
Not Defined
Not Defined
Straight Line
Early Adoption
Smart Growth
Low Carbon Gas
Delayed Adoption
Straight Line - No heat pumps
Not Defined
Not Defined
Not Defined
Not Defined
Not Defined

Domain: Automatic 

Next, the user can copy over data from one of the pre-existing packages to this new package by clicking “Package copying input: edit table” where the **blue** arrow is shown two figures above on the Main Package Screen. Then, on the screen displayed below, the user (1) chooses which package to copy from to their new package, (2) checks the box, and (3) hits the green check mark. It is very important that the user ensure they **DO NOT** choose to copy from one pre-existing package over another, as that **WILL** change the contents of the other package, leaving it mislabeled. Please ensure you have checked only the boxes to copy over your newly created package. Note: the package copying tool is not currently implemented for biomass packages, and attempts to copy / edit biomass packages may result in errors or incorrect results.

Edit Table of Package Copying Input

Package Key ▼

Copy From, Paste Over ▼

3

	Make Copy?	Copy From	Paste Over
Residential	2 <input checked="" type="checkbox"/>	1 Straight Line ▼	New Residential Package ▼
Commercial	<input type="checkbox"/>	Straight Line ▼	Not Defined ▼
Transportation	<input type="checkbox"/>	Low Carbon Gas ▼	Not Defined ▼
Industrial	<input type="checkbox"/>	Straight Line ▼	Not Defined ▼
Oil & Gas Extraction	<input type="checkbox"/>	Straight Line ▼	Not Defined ▼
Petroleum Refining	<input type="checkbox"/>	Not Defined ▼	Not Defined ▼
Agriculture	<input type="checkbox"/>	Not Defined ▼	Not Defined ▼
TCU	<input type="checkbox"/>	Not Defined ▼	Not Defined ▼
Non-Energy	<input type="checkbox"/>	Straight Line ▼	Not Defined ▼
Hydrogen	<input type="checkbox"/>	Straight Line ▼	Not Defined ▼
Pipeline Gas	<input type="checkbox"/>	Straight Line ▼	Not Defined ▼
Biomass	<input type="checkbox"/>	Baseline ▼	Not Defined ▼
Electricity	<input type="checkbox"/>	High BEV ▼	Not Defined ▼

The user can then finish the new package copying process by clicking “Copy New Package” on the Main Package Screen, as pointed to three figures above by the red arrow.

The user may now edit this new package by changing any of its underlying measures, equations, etc. For example, for the “New Residential Package” created above, the user may select this case as one to be evaluated (see Section 3.3), then change e.g. measures associated with that package by entering one of the associated sectoral tables, as shown below. The user should ensure they change the correct package by toggling to the name of their newly created package on the “Active Packages” list in the red box below. By selecting any of the drop down menus (example pointed to by black arrow), the user can then change the package’s measures.

Edit Table of Residential Building Shell (RES_BS)

Active Packages: RES ▼ **New Residential Package** ▼

A Measure Index ▼

Input-RES BS ▼

	Replacement Type	Technology	Technology Replaced	Measure Start Year	Measure Saturation Year	Measure End Year	Early Replacement: Annual Ratio of Selected Vintage(s) Stock Replaced	Early Replacement: Vintage(s) Replaced; Before- New
Measure 1	Natural Replacement	IECC 2000	Reference	2014	2014	2050	0	1950
Measure 2	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950
Measure 3	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950
Measure 4	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950
Measure 5	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950
Measure 6	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950
Measure 7	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950
Measure 8	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950
Measure 9	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950
Measure 10	Natural Replacement	IECC 2000	IECC 2000	2014	2014	2050	0	1950

Finally, the user can associate this package with a scenario by creating a new scenario (see 4.1) and selecting this package as one of the packages associated with that scenario (see 4.2).

4.4 Evaluating Results

Results of a user-defined case are obtained and evaluated in the same way as results of a pre-defined case. See section 3.3-3.5.